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Two new species and a new record of dragonets from New Caledonia (Teleostei: Callionymidae)

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Abstract

Two new species of dragonets (Callionymidae) are described from New Caledonia: *Callionymus kanakorum* **n. sp.** from Grande Terre is characterized by a small antrorse barb and two large points of equal length dorsally on the preopercular spine, the first dorsal fin low, at most with a short filament of the first spine, the second dorsal fin distally straight in both sexes, and the caudal fin without median filaments in both sexes; *Protogrammus antipodus* **n. sp.** which is distinguished within the genus by 3–7 dorsal points on the preopercular spine, 8 anal fin rays, 7 relatively long segments in the ventrolateral fold of skin, filamentous 1st to 3rd spines of the first dorsal fin in the male, and anal fin with distal black streaks. *Synchiropus rubrovinctus* is recorded from the Loyalty Islands. A revised key and a checklist of New Caledonian Callionymidae is presented, now including a total of 24 species.
Keywords: Dragonets, Callionymidae, new species, new record, New Caledonia, checklist.

Zusammenfassung

Zwei neue Leierfischarten (Callionymidae) werden aus Neukaledonien beschrieben: *Callionymus kanakorum* **n. sp.**, charakterisiert durch eine kleine antrorse Spitze und zwei große, gleich lange Spitzen dorsal auf dem Präoperkulardorn, eine niedrige erste Rückenflosse, deren erster Stachelstrahl höchstens ein kurzes Filament trägt, die zweite Rückenflosse bei beiden Geschlechtern distal gerade, und die Schwanzflosse ohne mediale Filamente; *Protogrammus antipodus* **n. sp.**, innerhalb der Gattung gekennzeichnet durch 3–7 dorsale Spitzen auf dem Präoperkulardorn, 8 Afterflossenstrahlen, 7 relativ lange Segmente der ventrolateralen Hautfalte, die filamentösen ersten drei Stachelstrahlen der ersten Rückenflosse des Männchens und die distalen schwarzen Linien auf der Afterflosse. *Synchiropus rubrovinctus* wird erstmals von den Loyalty-Inseln nachgewiesen. In einem überarbeiteten Bestimmungsschlüssel und einer Checkliste der Callionymidae Neukaledoniens werden nun 24 Arten unterschieden.

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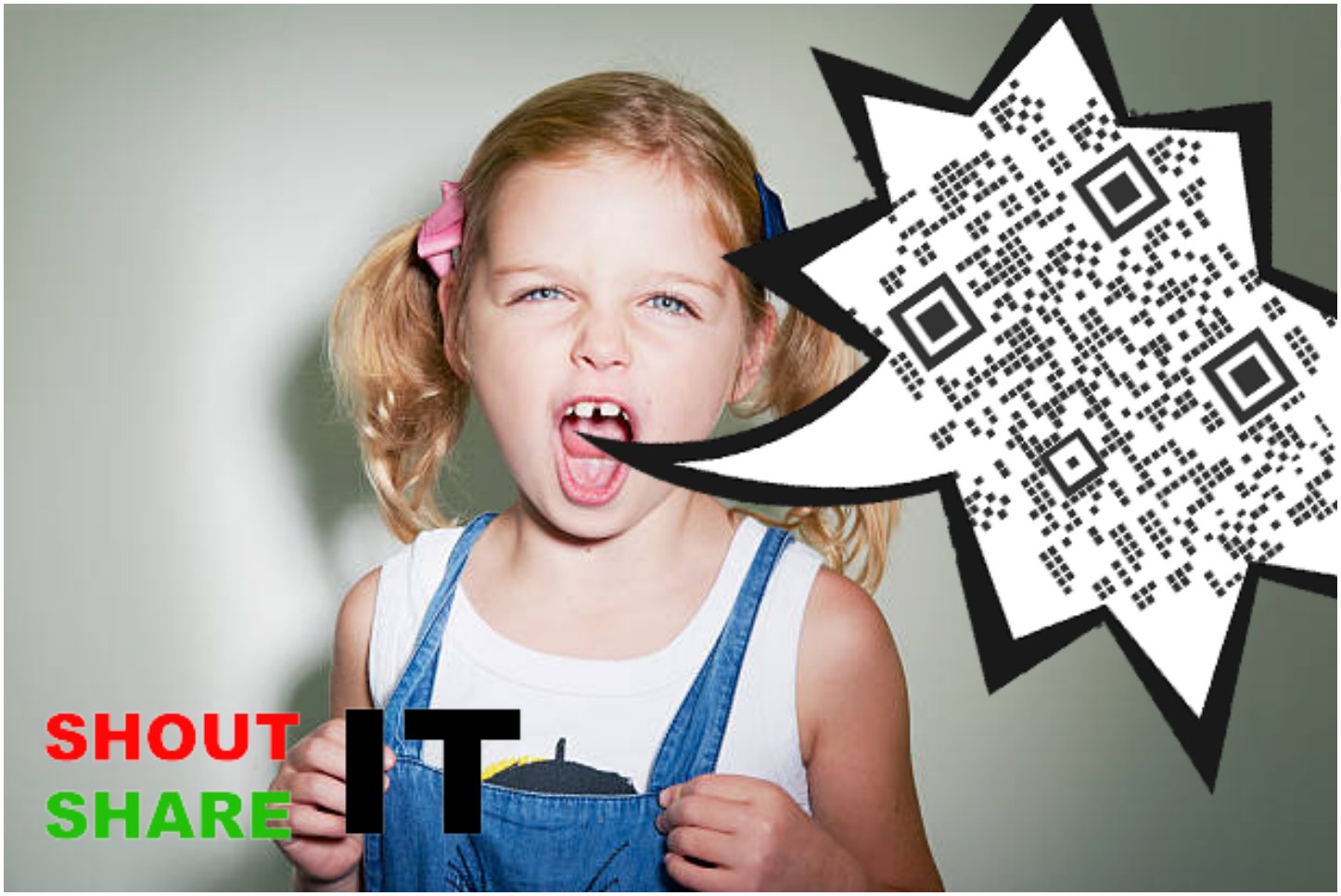
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1 Introduction

The French overseas territory New Caledonia comprises three major groups of islands, the Iles Chesterfield in the west, the main island "Grande Terre" with a few small islands towards the north and south, and the Iles Loyauté (Loyalty Islands) in the east. The archipelago is zoogeographically relatively isolated from other island groups of Melanesia and from Australia; the islands do not only have a unique land fauna, but also a relatively high degree of endemism in their marine fauna, which may be as high as 10 % (FRICKE, unpublished). This suggests the presence of a former barrier, but also a long geographical isolation with the survival of relict forms and a high percentage of subsequent speciation (FRICKE 1997).

The dragonets of the family Callionymidae are a group of benthic marine fishes, found in warm and temperate seas from the very shallows to depths of at least 800 m. Most species live on sandy or muddy substrates. The two largest genera, *Callionymus* and *Synchiropus*, are distributed nearly circumtropical. The Indo-Pacific species of the family have been revised by FRICKE (1983a), who distinguished a total of 82 species of *Callionymus* and 27 species of *Synchiropus*.

The family Callionymidae was not known from New Caledonia until FOURMANOIR & RIVATON (1979: 417–418) presented a record of *Callionymus japonicus* Houttuyn, 1782. FRICKE (1981a) renamed this fish *Callionymus moretonensis* (again described as *Callionymus kanakorum* n. sp. in the present paper). Later records of callionymid fishes from New Caledonia are as follows: *Synchiropus ocellatus* by FRICKE (1981b), *Callionymus enneactis*, *Synchiropus rameus* by FRICKE (1983a), *Callionymus corallinus* by FRICKE & ZAISER BROWNELL (1993). FRICKE (1993) revised the Callionymidae of New Caledonia for the first time, recording a total of 13 species including three new species (*Callionymus rivatoni*, *C. tethys*, *Synchiropus novaecaledoniae*). KULBICKI et al. (1994) found *Synchiropus circularis* Fricke, 1984 and *S. morrisoni* Schultz in Schultz et al. 1960 from the Chesterfield Bank. FRICKE (2000) again revised the Callionymidae of New Caledonia; he described the new species *Synchiropus orstom*, *S. richeri* and *S. signipinnis* and recorded *Callionymus scaber* McCulloch, 1926 (now *C.* sp., which cannot be identified to species level before males have been collected and examined), *C. pleurostictus* Fricke, 1982, *Synchiropus sechellensis* Regan, 1908 and *S. springeri* Fricke, 1983 from the territory, adding to 21 species of the family known from the area.

Recent investigations on the New Caledonian ichthyofauna, including material dredged by the Institut de Récherche pour le Développement, Nouméa, and additional material collected during the expedition LIFOU2000 in western Lifou, Loyalty Islands, resulted in the discovery of two new species and a new record of Callionymidae from New Caledonia, which are described in the present paper.

Acknowledgements

I would like to thank G. DUHAMEL (MNHN, Paris) for the loan of callionymid fish material from New Caledonia. P. BOUCHET (MNHN, Paris), B. RICHER DE FORGES (Institut de Recherche pour le Développement, Nouméa), and the team of the LIFOU2000 Expedition and of R/V Alis (supported by Fondation Total) assisted in the collection of material which is described in the present paper. I am grateful to JOHN E. RANDALL (Hawai'i) and an anonymous reviewer for commenting on the manuscript.

2 Methods and materials

2.1 Methods

Methods follow FRICKE (1983a). Caudal fin rays are counted following the method of FRICKE (1983b). In the description of new species, the data of the holotype are given first, followed by those of the paratypes (in parentheses). Measurements are common ichthyological standard except for the preorbital length, head length, predorsal and preanal lengths, standard and total lengths which have their anterior starting point on the middle of the upper lip, not the anterior part of the upper jaw (which is protractile). The head length is measured to the anterior margin of the branchial opening.

Specimens of *Protogrammus antipodus* n. sp. and *Synchiropus rubrovinctus* were collected with a research vessel (RV Alis) using a dredge ("Drague Waren"). The collecting method for *Callionymus kanakorum* n. sp. is unknown.

The following abbreviations are used in the text and in the keys:

A Anal fin
C Caudal fin
D Dorsal fin
D1 First dorsal fin
D2 Second dorsal fin
P_1 Pectoral fin
P_2 Pelvic fin
SL Standard length; measured from the mid of the upper lip to the mid of caudal fin base
TL Total length; measured from the tip of the upper jaw/mid of the upper lip to the end of the caudal fin

2.2 Materials

Specimens cited in the present paper are deposited in the following collections (in general, acronyms follow LEVITON et al. (1985) and LEVITON & GIBBS (1988), but with additions and amendments):

MNHN Museum National d'Histoire Naturelle, Paris, France
SFP Fish collection FRICKE (now in SMNS)
SMNS Staatliches Museum für Naturkunde, Stuttgart, Germany
SNHMB Staatliches Naturhistorisches Museum, Braunschweig, Germany

3 Callionymidae of New Caledonia

3.1 General remarks

The knowledge of the New Caledonian callionymid ichthyofauna has increased significantly in recent years (see introduction). Two new species and a new record in the present paper bring the total number of species up to 24 in 4 genera. A checklist of New Caledonian Callionymidae is presented (Tab. 1). 13 species are known from the East Coral Sea/Chesterfield Islands, 17 species from the Grande Terre Group

Tab. 1. Checklist of the callionymid fishes of New Caledonia. New records are printed in **bold face**. Species endemic to New Caledonia are marked with an asterisk (*).

Species	Chesterfield Islands	Grande Terre Group	Loyalty Islands	First record from New Caledonia
Callionymus sp. (aff. *scaber* McCulloch, 1926) *	X			Fricke 2002a
Callionymus brevianalis Fricke, 1983	X	X		Fricke 1993
Callionymus corallinus Gilbert, 1905	X	X		Fricke & Zaiser Brownell 1993
Callionymus enneactis Bleeker, 1879		X	X	Fricke 1983a
***Callionymus kanakorum* n. sp. ***		**X**		**present paper**
Callionymus keeleyi Fowler, 1941	X	X		Fricke 1993
Callionymus pleurostictus Fricke, 1982	X	X		Fricke 1993
Callionymus rivatoni Fricke, 1993 *	X	X		Fricke 1993
Callionymus simplicicornis Valenciennes in Cuvier & Valenciennes, 1837			X	Fricke 2002b
Callionymus tethys Fricke, 1993 *	X	X	X	Fricke 1993
Diplogrammus goramensis (Bleeker, 1858)	X	X	X	Rivaton et al. 1989
***Protogrammus antipodus* n. sp. ***			**X**	**present paper**
Synchiropus circularis Fricke, 1984	X			Kulbicki et al. 1994
Synchiropus morrisoni Schultz in Schultz et al., 1960	X			Kulbicki et al. 1994
Synchiropus novaecaledoniae Fricke, 1993*		X		Fricke 1993
Synchiropus ocellatus (Pallas, 1770)		X	X	Fricke 1981b
Synchiropus orstom Fricke, 2000 *		X		Fricke 2000
Synchiropus rameus (McCulloch, 1926)	X	X		Fricke 1983a
Synchiropus richeri Fricke, 2000 *		X		Fricke 2000
***Synchiropus rubrovinctus* (Gilbert, 1905)**			**X**	**present paper**
Synchiropus sechellensis Regan, 1908	X	X		Fricke 2000
Synchiropus signipinnis Fricke, 2000 *	X			Fricke 2000
Synchiropus splendidus (Herre, 1927)		X		Whitley 1961
Synchiropus springeri Fricke, 1983		X	X	Fricke 2000

(including one new record), and 8 species from the Loyalty Islands (including 2 new records). The endemic callionymid fish fauna of New Caledonia comprises 8 species, that is 33 % of the total species. This makes the territory one of the prime endemism centres of the Callionymidae.

3.2 Species accounts

3.2.1 *Callionymus kanakorum* n. sp. (Figs. 1–2)

Callionymus japonicus (non Houttuyn, 1782): Fourmanoir & Rivaton 1979: 417–418 (Sud de Nouvelle-Calédonie/New Caledonia, 22°20′S 167°10′30″E, 180 m depth).

Calliurichthys japonicus (non Houttuyn, 1782): Rivaton et al. 1989: 30 (Nouvelle-Calédonie/New Caledonia; in checklist).

Callionymus moretonensis (non Johnson, 1971): Fricke 1981a: 359–360 (part: New Caledonia). – Fricke 1993: 368 (Canal de la Havannah, Grande Terre, New Caledonia). – Fricke 2000: 16 (Canal de la Havannah, Grande Terre, New Caledonia). – Fricke 2002b: 33 (New Caledonia, Grande Terre).

Material

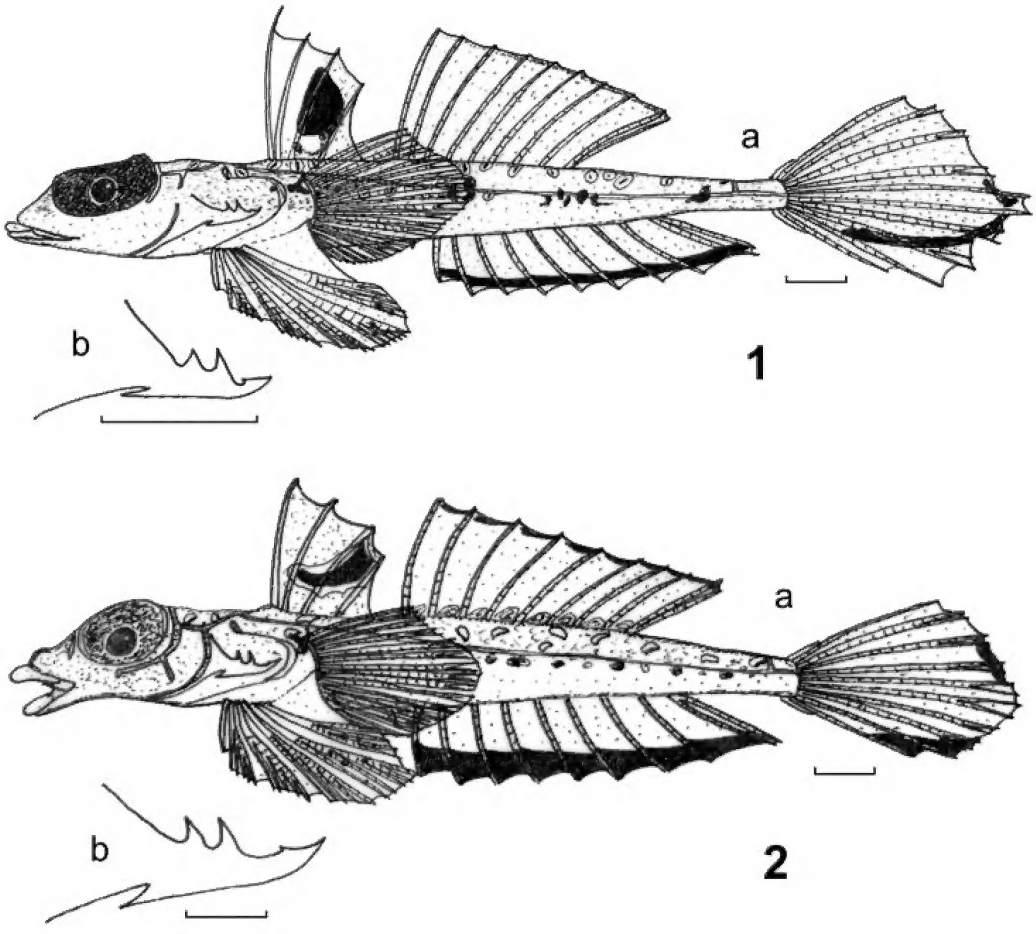
Total: 3 specimens.

Holotype. MNHN 2000-5519, female, 65.9 mm SL; Grande Terre, New Caledonia, 19°07′30″S 163°22′06″E, 110 m depth; R/V Vauban, Cruise MUSORSTOM4, St. DW. 150; 14 Sep. 1985.

Paratypes. SMNS 8550 (ex SFP 127-1979-036), 1 female, 68.0 mm SL; Canal de la Havannah, off southern Grande Terre, Province Sud, New Caledonia, 22°20′S 167°10′30″E, 180 m depth; FOURMANOIR, P.; 24 May 1978. – SMNS 12047 (ex SNHMB N37074, SNHMB I-10206), 1 male, 66.1 mm SL; Canal de la Havannah, off southern Grande Terre, Province Sud, New Caledonia, 22°22′S 167°01′E, 150 m depth; FOURMANOIR, P.; Nov. 1979.

Etymology

"Kanak" or "canaque" is a word of Polynesian origin, that is used in the Melanesian languages in the sense of "human being". It is the local name of the inhabitants of the islands of New Caledonia. The name of the new species is given in honour of the Kanak people in New Caledonia.



Figs. 1–2. *Callionymus kanakorum* n. sp., lateral view (a), left preopercular spine (b). – **1**. MNHN 2000-5519, holotype, female, 65.9 mm SL, Grande Terre, New Caledonia. **2**. SMNS 12047, paratype, male, 66.1 mm SL, Grande Terre, New Caledonia. – Scales: 5 mm.

Diagnosis

A *Callionymus* of the *Callionymus kaianus* species-group with 9 unbranched second dorsal and anal fin rays (the last divided at its base), 20–22 pectoral fin rays, the preopercular spine dorsally with a small antrorse point and two large points which are equal in length, the first spine of the first dorsal fin subequal in length with the first ray of the second dorsal fin, mostly with a short filament; the margin of the second dorsal fin distally straight in both sexes; the caudal fin without median filaments; the first dorsal fin with an ocellate black blotch on the third membrane, a basal branch of which may extend to the second membrane; the anal fin with a distal dark margin; the caudal fin with a large lower and a small upper black area.

Description

D IV (IV) + viii,1 (viii,1); A viii,1 (viii,1); P_1 ii,18,ii (total 22) (i,18,i, total 20); P_2 I,5 (I,5); C (i),i,3,ii,2,ii,(i) [total principal rays 10] [(i),i,7,ii,(i) or (i),i,3,ii,2,ii,(i)].

Body elongate and depressed. Head depressed, triangular when seen from above, tip rounded, 3.6 (3.8; 4.0). Eye large, 2.1 (2.1; 2.2) in head. No supraorbital tentacles. Preorbital length in head 5.4 (3.6; 4.0). Interorbital distance 30.3 (16.7; 17.2) in head. Upper jaw length 3.2 (2.9; 3.1) in head. Preopercular spine with an elongate, very slightly upcurved main tip, one small antrorse barb close to main tip and two large, curved points on its dorsal margin, no points on ventral margin, and a strong antrorse point at its base, formula 1 $\frac{3}{}$ 1 (1 $\frac{3}{}$ 1). Preopercular spine length 3.7 (3.1) in head. Head lateral line system with a short postorbital and a long but disconnected preoperculo-mandibular branch. Urogenital papilla in male 11.1 in head, in female 22.8 (19.1) in head. Body depth 8.8 (8.3; 8.4) in SL. Body width 5.6 (5.9; 6.0) in SL. Lateral line without branches; the lines of the opposite sides are interconnected by a commissure each across the occipital region and across the dorsal part of the caudal peduncle. Caudal peduncle length 5.5 (4.8; 4.9) in SL. Caudal peduncle depth 28.6 (23.4; 31.4) in SL.

First dorsal fin in the male a little higher than second dorsal fin, without filaments, 1st spine 5.9 in SL, 2nd spine 6.4 in SL, 3rd spine 6.9 in SL, 4th spine 9.5 in SL; about as high as second dorsal fin in the female, the 1st spine with a short filament, the other spines not filamentous, decreasing in length posteriorly; 1st spine in the female 5.0 (6.0) in SL, 2nd spine 6.2 (6.5) in SL, 3rd spine 6.5 (6.9) in SL, 4th spine 8.9 (8.6) in SL. Membrane behind 4th spine present. Predorsal(1) length 3.0 (3.1; 3.2) in SL. Second dorsal fin distally straight in both sexes. First ray in the male 5.9 in SL, 5th ray 7.2 in SL, last ray 7.1 in SL; 1st ray in female 5.5 (5.9) in SL, 5th ray 6.2 (6.6) in SL, last ray 7.1 (7.3) in SL. Predorsal(2) length 2.0 (2.1; 2.2) in SL. Anal fin beginning on a vertical through 1st to 2nd membrane of second dorsal fin. First ray of anal fin 18.3 (10.5; 18.0) in SL, last ray 7.4 (6.8; 8.2) in SL. Preanal fin length 1.9 (2.0) in SL. Pectoral fin distally convex, reaching to 3rd anal fin ray when laid back; pectoral fin length 5.2 (4.9; 5.1) in SL. Prepectoral fin length 2.6 (2.6; 2.7) in SL. Pelvic fin reaching to base of 1st anal fin ray or a little beyond when laid back; pelvic fin length 3.8 (3.7; 4.0) in SL. Prepelvic fin length 3.9 (3.9) in SL. Caudal fin a little elongate, with the two median unbranched (rarely branched) rays extended but not filamentous; caudal fin length in male 5.1 in SL, in female 3.2 (3.6) in SL.

Colour in alcohol. Head and body creamy white, eye silvery to brownish grey. Preorbital region with a dusky spot; cheeks yellowish, thorax white. Upper part of

pectoral fin base with a Y-shaped black blotch. Back with short ocellate black streaks. Sides of body with groups of 1–5 black blotches. Belly and lower sides of body white. First dorsal fin in the male white, with a large black blotch on 3rd membrane extending on the posterior part of 2nd membrane. Second dorsal fin in the male translucent, with a narrow greyish distal margin and a basal grey spot on each membrane. Anal fin whitish, with a distal black band. Caudal fin whitish, with an oblique black band in its lower one-third extending on the median distal rays and a little black area on the upper distal part. Pectoral fin translucent; pelvic fin whitish, with a distal group of small black spots each on 4th and 5th rays.

Sexual dimorphism. Males have a slightly darker colouration than females, especially in the anal and second dorsal fins, and a longer urogenital papilla.

Distribution

The new species is known only from Grande Terre, New Caledonia; it was collected at depths of 110–180 m.

Comparison

This new species is similar to the Australian species *Callionymus moretonensis* Johnson, 1971 and *C. bifilum* Fricke, 2000; it differs from these two species in lacking caudal fin filaments in both sexes, the male's distally straight second dorsal fin (distally convex in *C. moretonensis* and *C. bifilum*), and the two large dorsal points on the preopercular spine equal in length (anterior point shorter in *C. moretonensis* and *C. bifilum*).

Within the *Callionymus kaianus* species-group (alternatively classified as genus *Bathycallionymus* by NAKABO 1982), *C. kanakorum* belongs to the subgroup with a distally straight second dorsal fin in males, the preopercular spine with a small antrorse barb and the caudal fin without filaments; other species in this subgroup are *Callionymus kotthausi* Fricke, 1981 from India (which differs in the head, first and second dorsal and caudal fin colouration and the shape of the preopercular spine), *C. regani* Nakabo, 1979 from the Western Indian Ocean (with a different head colouration, pectoral fin base, first and second dorsal and caudal fin colouration and the anterior point on the dorsal margin of the preopercular spine much smaller than the posterior point, and *Callionymus whiteheadi* Fricke, 1981 from Indonesia (differing in the head, first and second dorsal and caudal fin colouration and the shape of the preopercular spine).

Remarks

The two paratypes were assigned with doubt to *C. moretonensis* by FRICKE (1981a), as the preopercular spines and caudal fins were damaged so that the specific characters were not easily visible. The discovery of a fine new specimen (MNHN 2000-5519) allowed the distinction from *C. moretonensis* of New Caledonian material at the species level.

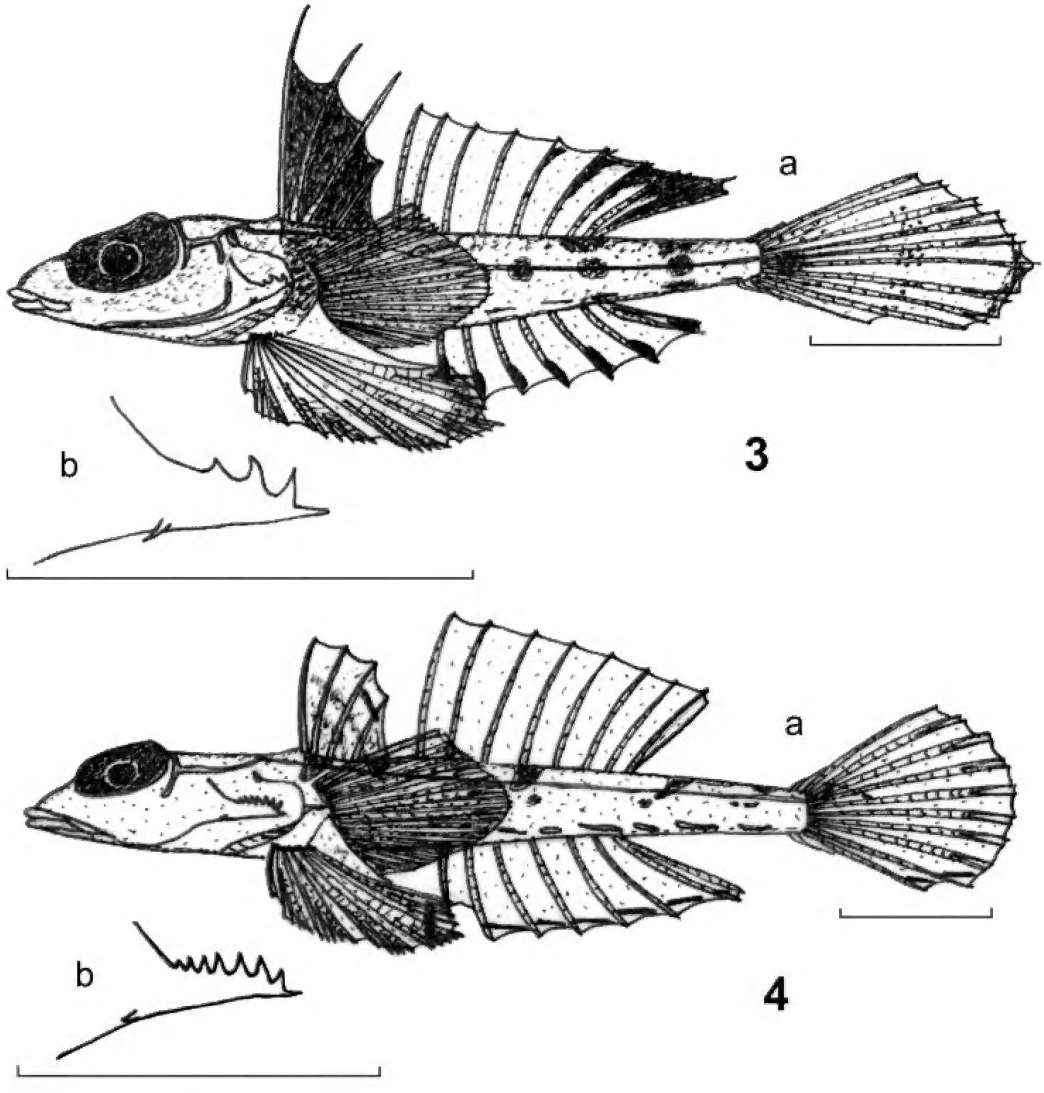
3.2.2 *Protogrammus antipodus* **n. sp.** (Figs. 3–4)

Material

Total: 2 specimens.

Holotype. SMNS 23698, male, 21.2 mm SL; Baie du Santal, west of Récif Shelter, off Pointe Lefèvre, west coast of island, Lifou Island, Province Iles, Loyalty Islands, New Caledonia, 20°54′11″S 167°01′40″E – 20°54′14″S 167°01′07″E, 200–220 m depth, sand bottom with few rubble; FRICKE, R., R/V Alis, Cruise LIFOU2000, St. RF 00 NC 41; 19 Nov. 2000.

Paratype. MNHN 2006-1235 (ex SMNS 23937), 1 female, 29.3 mm SL; off Pointe Lefèvre, west coast of island, Lifou Island, Province Iles, Loyalty Islands, New Caledonia, 20°54′06″S 167°00′18″E – 20°54′34″S 167°00′15″E, 70–130 m depth, substrate of coralline gravel and sand; RICHER DE FORGES, B., R/V Alis, Cruise LIFOU2000, St. RF 00 NC 54 (LIFOU2000, St. 55); 22 Nov. 2000.



Figs. 3–4. *Protogrammus antipodus* n. sp., lateral view (a), left preopercular spine (b). – **3**. SMNS 23698, holotype, male, 21.1 mm SL, Lifou, Loyalty Islands. **4**. MNHN 2006-1235, paratype, female, 29.3 mm SL, Lifou, Loyalty Islands. – Scales: 5 mm.

Etymology

The new species is named after the antipodes, as it occurs very far from its sister species *P. sousai* (Maul), from the Northeast Atlantic.

Diagnosis

A species of *Protogrammus* with 3–7 dorsal points on the preopercular spine, 8 anal fin rays, 7 relatively long segments in the ventrolateral fold of skin, filamentous 1st to 3rd spines of the first dorsal fin filamentous in the male, and anal fin with distal black streaks.

Description

D IV (00) + v,4 (vii,1) (total of 8–9 soft rays); A vi,1 (vi,1); P_1 i,18,i (total 20) (ii,22,i, total 25); P_2 I,5 (I,5); C (iii),i,7,ii,(iii) [(ii),i,7,ii,(ii)].

Body elongate and moderately depressed. Head moderately depressed, triangular with rounded tip when seen from above, 3.5 (3.6) in SL. Eye 2.0 (2.4) in head. Preorbital length 4.4 (4.3) in head. Interorbital distance 30.5 (14.6) in head. A small dorsal dermal flap present over pupil. No supraorbital tentacles. Upper jaw length 3.3 (2.4) in head. Head lateral line system with a short postorbital and a short preoperculo-mandibular branch which is disconnected but continued ventrally along the margin of the preopercle. Preopercular spine with an upcurved main tip, 3–7 additional, recurved points on ist dorsal margin, no points on ventral margin but a small antrorse spine at its base, formula $1 \frac{3}{} 1$ ($1 \frac{7}{} 1$). Preopercular spine length 3.2 (3.4) in head. Operculum with a free flap of skin only in its lower half, but attached to the body in its upper half. Urogenital papilla not visible in either sex. Body depth 6.6 (8.6) in SL. Body width 6.0 (5.7) in SL. Lateral line extending to base of caudal fin, no branches, the lines of the two sides of the body interconnected by an occipital commissure, no commissures across the caudal peduncle. Lower sides of body with a ventrolateral fold of skin divided into 7 relatively long segments. Caudal peduncle length 4.1 (4.8) in SL. Caudal peduncle depth 22.3 (15.8) in SL.

First dorsal fin high in the male, 1st spine longest, 1st to 3rd spines with filaments, 2nd to 4th spines decreasing in length; 1st spine in the male 3.6 in SL, 2nd spine 4.1 in SL, 3rd spine 4.2 in SL, 4th spine 11.2 in SL. First dorsal fin low in the female, without filaments, 1st spine lower than 1st ray of second dorsal fin; 1st spine in the female 6.7 in SL, 2nd spine 6.8 in SL, 3rd spine 7.1 in SL, 4th spine 10.4 in SL. Membrane behind 4th spine of first dorsal fin present, of moderate size. Predorsal(1) length 2.8 (2.9) in SL. Second dorsal fin distally straight in the male, slightly convex in the female. First ray in male 6.6 in SL, last ray 5.4 in SL; 1st ray in female 5.0 in SL, last ray 7.0 in SL. Predorsal(2) length 2.0 (2.1) in SL. Anal fin beginning on the vertical through 2nd to 3rd membrane of second dorsal fin. First ray of anal fin 15.1 (10.5) in SL, last ray 8.5 (5.6) in SL. Preanal fin length 1.8 (1.9) in SL. Pectoral fin distally convex, reaching back to base of 2nd or 3rd anal fin membrane; pectoral fin length 4.6 (4.4) in SL. Prepectoral fin length 2.6 (2.8) in SL. Pelvic fin reaching to base of 3rd anal fin membrane when laid back; pelvic fin length 3.0 (3.8) in SL. Prepelvic fin length 3.2 (2.8) in SL. Caudal fin slightly elongate in the male, distally convex; shorter and distally convex in the female; without filaments in both sexes; caudal fin length in male 2.9 in SL, in female paratype 3.7 in SL.

Colour in alcohol. Head and body creamy white, eye dark grey. Dermal flap over pupil with dark pigmentation. Sides of body in male with three dark blotches along

the lateral line, the first below 5th membrane of second dorsal fin, the second below last membrane of second dorsal fin, the third on the caudal peduncle; spots present in female but smaller. Back with about 5 dark saddles. Belly and lower sides of body white. First dorsal fin black in the male, pale in the female, with 3 oblique dark bands and a short black streak distally on 3rd membrane. Second dorsal fin translucent, posterior membranes distally black in male. Anal fin with a distal black streak on each membrane. Caudal fin pale, male with a basal dark blotch, a median vertical dusky area, and a distal dark margin; female with a small basal dark spot, and two short black streaks distally on the lower two membranes. Pectoral fin translucent; pelvic fin pale, 4th and 5th rays and membrane in between distally blackish.

Sexual dimorphism. The male has a higher first dorsal fin than the female, with filaments on the anterior 3 spines (first dorsal fin lower in the female, spines not filamentous), a distally straight second dorsal fin with the last ray longer than in the female, an elongate caudal fin (shorter in the female), and a different colouration of the first and second dorsal fins.

Distribution

The new species is known only from western Lifou Island, Province Ile, Loyalty Islands, New Caledonia, where it was dredged on sand bottom with coralline gravel or rubble at depths of 70–220 m (possibly restricted to 130–210 m).

Comparison

Protogrammus antipodus n. sp. is classified as a member of the genus *Protogrammus* by the presence of a fragmented ventrolateral fold of skin, a free flap of skin only on the ventral half of the opercle, the shape of the preopercular spine, the absence of supraorbital or body tentacles, papillae on the lower lip, a detached 1st pelvic fin ray, and a double lateral line. Within the genus, it differs from the only other species, *Protogrammus sousai* (Maul, 1972) from Meteor Seamount, Northeastern Atlantic Ocean (known from sand bottoms at 310–320 m depth), by its 3–7 dorsal points on the preopercular spine (only 1 dorsal point in *P. sousai*), its 8 anal fin rays (9 in *P. sousai*), its longer but less numerous segments of the ventrolateral fold of skin (7 longer segments in *P. antipodus*, about 16 short segments in *P. sousai*), the presence of filaments in the first dorsal fin of the male (no filaments in *P. sousai*), and the distal black streaks in the anal fin (anal fin plain pale in *P. sousai*).

Remarks

This is a very surprising finding of a genus that was previously believed to be monotypic and restricted to the northeastern Atlantic. *Protogrammus antipodus* was found in a similar habitat as *P. sousai*, slightly shallower but still in deep water. This habitat type is rarely sampled for small fishes, as a special type of dredge is needed, and a specialist needs to be on board to sort out and care for these small fishes. Furthermore, the species of the genus *Protogrammus* are apparently rare; during more than 40 dredge hauls in suitable habitats off Lifou, only two specimens of *P. antipodus* were collected; *P. sousai* is likewise known only from very few specimens, though extensive collecting effort was performed on Great Meteor Bank. Careful dredging on deep insular shelf sand and rubble bottoms may result in the discovery of additional species of the genus in other parts of the Indo-West Pacific.

The presence of the two species of *Protogrammus* in far distant areas, one of them in the Northeast Atlantic, the other in the Southwest Pacific, is zoogeographically interesting. Though the disjunct distribution may be due to lack of collecting in other areas, the distribution pattern suggests that the genus *Protogrammus* in its present character state at least existed in the Miocene, about 18 million years ago, prior to the closure of the Tethys Sea, and has remained unchanged since that time. *Protogrammus* has less apomorphic characters than *Diplogrammus* (see FRICKE 1988), and is assumed to be close to the missing link between *Synchiropus* and *Diplogrammus*.

3.2.3 *Synchiropus rubrovinctus* (Gilbert, 1905)

Callionymus rubrovinctus Gilbert, 1905: GILBERT 1905: 650–651, fig. 252 (cannel between Maui and Lanai Islands/Hawaiian Islands, 28–43 fms [51–79 m] depth).
Synchiropus rubrovinctus: FRICKE 1981b: 139–142 (Hawaiian Islands; revision). – FRICKE 1983a: 660–663 (Hawaiian Islands; revision). – RANDALL 1999: 204–206 (Hawaiian Islands). – FRICKE 2002b: 65 (Japan, Hawaiian Islands; checklist).

Material

Total: 2 specimens.
New Caledonia, Province Iles, Loyalty Islands. SMNS 23939, 1 specimen, 17.3 mm SL; off Pointe Lefèvre, west coast of island, Lifou Island, 20°54′06″S 167°00′18″E – 20°54′34″S 167°00′15″E, 70–130 m depth, substrate of coralline gravel and sand; RICHER DE FORGES, B., R/V Alis, Cruise LIFOU2000, St. RF 00 NC 54 (LIFOU2000, St. 55); 22 Nov. 2000. – SMNS 24049, 1 specimen, 11.6 mm SL; Baie du Santal, off Hunété, 8 km W Xepenehe, Lifou Island, 20°46′21″S 167°05′46″E – 20°46′27″S 167°05′34″E, 25–80 m depth, substrate of coral rubble; RICHER DE FORGES, B., R/V Alis, Cruise LIFOU2000, St. 49; 22 Nov. 2000.

Diagnosis

A pygmy *Synchiropus* with 8 branched rays in the second dorsal fin, 8 rays in the anal fin, 17–18 pectoral fin rays, no supraorbital tentacles, 2–4 curved points on the dorsal margin of the preopercular spine additional to the main tip, one antrorse point at its base, branchial opening sublateral in position, 1st spine of first dorsal fin elongate and filamentous; the remainder of the fin low; second dorsal fin distally slightly convex; caudal fin slightly convex, nearly truncate, without filaments; head and body red in life, lower half whitish.

Distribution

Japan (Izu Peninsula); Hawaiian Islands (Maui, Lanai); Loyalty Islands (Lifou). **New record** from the Loyalty Islands, where the species was dredged on coralline gravel or rubble at depths of 25–130 m (probably restricted to 50–80 m, where most of the dredging was performed). In Japan and the Hawaiian Islands, the species was usually collected at similar depths, rarely shallower, also on coralline gravel.

Remarks

This new finding of *Synchiropus rubrovinctus* from the Southwest Pacific does not necessarily mean that the species has an antiequatorial distribution. As its habitat is rarely sampled and the species is relatively rare in the habitat, it is expected to be more widespread in the western and central Pacific Ocean.

3.3 Key to the Callionymidae of New Caledonia

1 Operculum with a free flap of skin; sides of body with a ventrolateral fold of skin below the lateral line. **2**
– Operculum without a free flap of skin; sides of body without a ventrolateral fold of skin below the lateral line. **3**
2 Free flap of skin over the full height of the operculum; ventrolateral fold of skin on sides of body entire. . . . . ***Diplogrammus goramensis*** (Bleeker, 1858)
– Free flap of skin only on ventral half of operculum, dorsal parts attached to body; ventrolateral fold of skin on sides of body consisting of 7 separate segments. . . . . ***Protogrammus antipodus* n. sp.**
3 Soft dorsal fin rays branched; preopercular spine without an antrorse spine at its base (except *Synchiropus rameus* and *S. sechellensis*, which have the first dorsal fin very high but without filaments, first spine more than 2.5 times in first ray of second dorsal fin). . . . . Genus ***Synchiropus*, 4**
– Soft dorsal fin rays unbranched except the last which is divided at its base; preopercular spine base with an antrorse spine at its base; if first dorsal fin not filamentous, less than twice as long as first spine of second dorsal fin. . . . . Genus ***Callionymus*, 15**
4 Preopercular spine base with an antrorse spine. **5**
– Preopercular spine base without an antrorse spine. **6**
5 Main tip of preopercular spine upcurved, dorsal margin with 2 large curved points. . . . . ***Synchiropus sechellensis*** Regan, 1908
– Main tip of preopercular spine straight, dorsal margin with 4–11 small antrorse serrae. . . . . ***Synchiropus rameus*** (McCulloch, 1926)
6 Dorsal margin of preopercular spine with 2–5 curved points (additional to the main tip). **7**
– Dorsal margin of preopercular spine with 1 curved point (additional to the main tip). . **11**
7 Pectoral fin with 28–35 rays. . . . . ***Synchiropus splendidus*** (Herre, 1927)
– Pectoral fin with 17–25 rays. **8**
8 First spine of first dorsal fin with a very long filament, remainder of fin low. . . . . ***Synchiropus rubrovinctus*** (Gilbert, 1905)
– First spine of first dorsal fin not not with a long filament (fin may be high or low). **9**
9 Dorsal margin of preopercular spine with 2 curved points (additional to the main tip). **10**
– Dorsal margin of preopercular spine with 3–4 curved points (additional to the main tip). . . . . ***Synchiropus springeri*** Fricke, 1983
10 Sides of body with large, circular, light blotches which are surrounded by a dark line. . . . . ***Synchiropus circularis*** Fricke, 1984
– Body colouration not as described above; usually reddish, with starry pattern on the sides consisting of median dark and ventral white spots. . . . . ***Synchiropus morrisoni*** Schultz in Schultz et al., 1960
11 Main tip of preopercular spine straight. **12**
– Main tip of preopercular spine upcurved. **13**
12 Eye large, its diameter 1.9–2.0 in head; first dorsal fin in male with 1 filament; first dorsal fin pale in male. . . . . ***Synchiropus signipinnis*** Fricke, 2000
– Eye medium, its diameter 2.1–2.8 in head; first dorsal fin in male with 3 filaments; first dorsal fin striped in male. . . . . ***Synchiropus novaecaledoniae*** Fricke, 1993
13 Body brown, sides with starry blotches; first dorsal fin brown in male, with 4 ocelli. . . . . ***Synchiropus ocellatus*** (Pallas, 1770)
– Body pale or reddish; colouration of first dorsal fin not as described above, fin at most with a single dark blotch or ocellus. **14**
14 Eye large, diameter 1.7–2.1 in head; first dorsal fin without filament; caudal fin in male with median filaments. . . . . ***Synchiropus richeri*** Fricke, 2000
– Eye medium, diameter 2.1–2.5 in head; first dorsal fin with filament; caudal fin without median filaments. . . . . ***Synchiropus orstom*** Fricke, 2000
15 Main tip of preopercular spine straight, dorsal margin with small antrorse serrae. **16**
– Main tip of preopercular spine upcurved, dorsal margin with 1 or more large curved points. **24**
16 D2 total 9 rays; A total 8 rays. **17**

– D2 total 7–8 rays; A total 6–7 rays. **22**
17 D1 with 1 to 4 filaments, urogenital papilla visible (males). **18**
– D1 without filaments, urogenital papilla not visible (females). **20**
18 D1 with 4 filaments. ..... ***Callionymus* sp.** (aff. *scaber* McCulloch, 1926)
– D1 with 1 or 3 filaments. **19**
19 D1 with 1 filament (1st spine), mottled with dark, no lines, with an ocellus surrounding the distal part of the third spine; thorax with a faint brown spot, but without surrounding lines. ..... ***Callionymus rivatoni*** Fricke, 1993
– D1 with 3 filaments (1st to 3rd spines), with narrow oblique dark lines, 2nd membrane distally with a small dark spot close to 2nd spine, no ocellus; thorax with a dark spot surrounded by lines extending on the membrane between pelvic and pectoral fins. ..... ***Callionymus tethys*** Fricke, 1993
20 Caudal fin length 1.6–2.2 in SL. **21**
– Caudal fin length 2.4–3.6 in SL. ..... ***Callionymus tethys*** Fricke, 1993
21 Ventral margin of preopercular spine concave, dorsal margin with 7–12 small antrorse serrae; distal half of anal fin blackish. ..... ***Callionymus* sp.** (aff. *scaber* McCulloch, 1926)
– Ventral margin of preopercular spine straight, dorsal margin with 4–7 small antrorse serrae; distal one-fifth of anal fin blackish. ..... ***Callionymus rivatoni*** Fricke, 1993
22 D2 vi,1; A v,1; 2–4 small antrorse serrae on the dorsal margin of the preopercular spine. ..... ***Callionymus brevianalis*** Fricke, 1983
– D2 vii,1; A vi,1; 5–14 small antrorse serrae on the dorsal margin of the preopercular spine. **23**
23 First dorsal fin in male without filaments; first dorsal fin in female with black blotch mainly on second membrane, with a narrow posterior branch reaching to fourth membrane. ..... ***Callionymus simplicicornis*** Valenciennes in Cuvier & Valenciennes, 1837
– First spine of first dorsal fin with a long filament in male; first dorsal fin in female mainly on third membrane, a narrow anterior branch reaching to second membrane. ..... ***Callionymus pleurostictus*** Fricke, 1982
24 Dorsal margin of preopercular spine with a small antrorse barb and 1–2 large curved points; first dorsal fin with a large ocellus on second and third membranes. ..... ***Callionymus kanakorum* n. sp.**
– Dorsal margin of preopercular spine without an antrorse barb; first dorsal fin without a large ocellus. **25**
25 D2 vii,1; A vi,1; cheeks with 2 vertical ocellate black streaks. ..... ***Callionymus enneactis*** Bleeker, 1879
– D2 viii,1; A vii,1; cheeks without vertical ocellate streaks. **26**
26 First dorsal fin with two long filaments; caudal fin elongate; body depth 7–10 in SL. ..... ***Callionymus keeleyi*** Fowler, 1941
– First dorsal fin high in males; low in females, without filaments; caudal fin distally rounded; body depth 4.5–6 in SL. ..... ***Callionymus corallinus*** Gilbert, 1905

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